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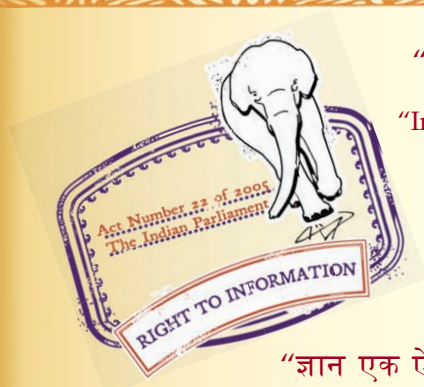
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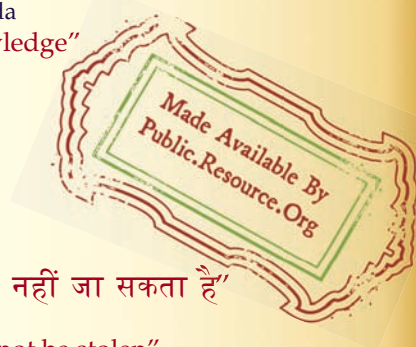
IS 8509-1 (1977): Code of practice for tests and trials of dredgers, Part 1 Self-propelled trailing hopper suction dredgers [TED 18: Inland, Harbour Crafts and Fishing Vessels]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



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*Indian Standard*

CODE OF PRACTICE FOR  
TESTS AND TRIALS OF DREDGERS

PART I SELF-PROPELLED TRAILING HOPPER  
SUCTION DREDGERS

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**INDIAN STANDARDS INSTITUTION**

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NEW DELHI 110002

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# Indian Standard

## CODE OF PRACTICE FOR TESTS AND TRIALS OF DREDGERS

### PART I SELF-PROPELLED TRAILING HOPPER SUCTION DREDGERS

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*Indian Standard*

**CODE OF PRACTICE FOR  
TESTS AND TRIALS OF DREDGERS**

**PART I SELF-PROPELLED TRAILING HOPPER  
SUCTION DREDGERS**

**0. FOREWORD**

**0.1** This Indian Standard ( Part I ) was adopted by the Indian Standards Institution on 30 June 1977, after the draft finalized by the Inland and Harbour Craft Sectional Committee had been approved by the Marine, Cargo Movement and Packaging Division Council.

**0.2** The dredgers are mainly port and harbour crafts. The basic division of dredgers come under self-propelled and dumb ones. There have been continuous changes in size and power for the dredgers, primemovers have changed to direct diesel-drive, diesel-electric, steam turbine, gas turbine and shore-supplied electric drive and the mechanical elevators have changed to hydraulic elevators. The type of dredge may be classified as follows:

- a) Grab dredge,
- b) Dipper dredge,
- c) Bucket dredge,
- d) Suction dredge,
- e) Cutter suction dredge, and
- f) Trailing dredge.

**0.3** Among the different test requirements, the shop tests for the engines of the dredgers are also included. In fact the shop test requirements for marine engines for different types of vessels are mostly common and will be covered in a separate standard. In the absence of such a standard, at present, these requirements for main and auxiliary machinery for dredgers have been given in Appendix A of this standard.

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**1. SCOPE**

**1.1** This standard ( Part I ) lays down tests and trials required to be carried out with self-propelled, trailing, hopper suction dredgers and their systems for assessing their performance for acceptance.

## **2. SHOP TESTS**

**2.1** Shop tests shall be carried out on all main and auxiliary machinery in the manufacturer's shop. The extent of tests shall be as agreed to between the shipbuilder and the owner, subject to the provisions of statutory authorities/classification societies. The guidelines on shop test requirements are given in Appendix A.

## **3. TESTS AND TRIALS AFTER COMPLETION**

**3.1 Stability Requirements** — The builder shall ensure sufficient stability of the vessel for the intended service in accordance with the requirements of the statutory authorities.

**3.2 Basin Trials** — Basin trials shall be carried out with the objective of ensuring proper functioning of main and auxiliary machinery and other equipment.

**3.2.1** All controls and instruments including safety devices shall be checked for proper functioning.

**3.2.2** All auxiliary machinery and equipment shall be tested on load.

**3.2.3** Main machinery including the gear box shall be run on light load condition for making adjustment and proper matching.

**3.2.4** The total air-receive capacity is to be sufficient to provide without replenishment, not less than 12 consecutive starts of each engine. When electrical starting engines have been accepted by the owner the battery capacity shall be such that at least 12 consecutive starts will be possible without recharging the battery but arrangement must be provided to charge the battery in case it is needed.

**3.2.5 Parallel Operation of Generators** — All alternators/generators shall be run for four consecutive hours under available load conditions.

**3.2.6** All other electrical installations shall be tested in accordance with the statutory/classification society requirements.

## **4. PERFORMANCE TRIALS**

**4.0** The following performance tests/trials shall be carried out and all relevant observations shall be recorded. During speed and endurance trials, the vessel shall be at design full load draught.

**4.1 Endurance Test** — Endurance test shall be carried out for 6 hours at rated power. Fuel consumption, cooling and lubricating oil temperature, etc, shall be recorded. All machinery tests shall be recorded. All machinery shall be watched against unsatisfactory operation, excessive vibration and overheating at any point. Suitable runs shall be taken to test the stern gear under full load conditions.

**4.2 Hopper Test** — The hopper doors shall be closed. Tightness for the dredger materials shall be tested with hopper full.

**4.3 Speed Trial** — Full power speed trials shall be carried out over a measured distance, the speed being measured as the mean of three consecutive double runs.

**4.4 Steering and Manoeuvrability Trial** — Steering and manoeuvrability trials shall be carried out to verify the manoeuvring qualities at light or loaded conditions as agreed to between the owner and the builder. In addition tests shall also be carried out on stand-by/hand steering gears to meet the statutory/classification society requirements.

**4.5 Ventilation Test** — Ventilation tests shall be carried out to statutory requirements.

**4.6 Anchor Trials** — Anchor trials shall be carried out to test the performance of windlasses and anchoring gear to meet with the statutory/classification society requirements.

## 5. DREDGING TRIALS

**5.1** Dredging trials shall be carried out at a site and with materials as agreed to between the owner and the builder. The dredge pumps shall be tested for the rated discharge. The recorded performance shall be verified against the guaranteed performance.

**5.2** Dredging shall be done both with and against the tide and the specified draughts shall be maintained throughout the operation.

**5.3** The following shall be recorded during the dredging trials:

- a) Time taken to take full load,
- b) Time taken to dump the load,
- c) Concentration and flow velocity of the dredged mixture. The flow velocity shall be measured subject to the availability of the equipment,
- d) Revolutions of the dredge pump engines,
- e) Main engine revolutions,
- f) Dredging depth of water,
- g) Spoil samples,
- h) Draught trim and list reading,
- j) Time taken to dewater the hopper,
- k) Time taken to open and close the hopper doors,
- m) Suction vacuum readings,
- n) Time taken to pump out the load overside, and
- p) Swell compensator pressures.

**5.4** Trials shall also be made to test the following, wherever applicable:

- a) Agitation dredging gear,
- b) Mixture selection gear, and
- c) Overside discharge of the hopper load into shore pipe lines.

## **6. FINAL UNDER WATER INSPECTION**

**6.1** The vessel shall be dry-docked for inspection of underwater fittings, machinery and gear, painting, etc, at the port of construction before sailing for final trials at port of delivery, if required by the owner.

# **A P P E N D I X   A**

( *Clauses 0.3 and 2.1* )

## **SHOP TEST REQUIREMENTS**

### **A-1. PROPULSION AND DREDGE PUMP ENGINE**

**A-1.1** Each engine shall be tested individually and preferably with its gear box and complete with all controls and instruments. In case combined test is not possible, the gear box alone shall be tested for 4 hours on full load and 1 hour on 10 percent overload.

**A-1.2** The schedule of tests shall be as follows.

**A-1.2.1 *Part Load Test*** — The engine shall be tested under part loads of 25 percent, 50 percent and 75 percent of full load for 30 minutes each and be capable of running smoothly on each test without need for any adjustment.

**A-1.2.2 *Full Load Test*** — The engine shall be run in the ahead direction for 2 hours continuously at the guaranteed power and speed. The rate of fuel consumption at full load test shall lie within the values specified by the manufacturer. The allowable excess consumption shall not exceed 5 percent of the rated value. The engine shall be capable of running continuously during this period steadily with a clear exhaust without excessive vibration, without undue heating of bearings and other parts and without unusual engine noise.

**A-1.2.3 *10 Percent Overload Test*** — Following the full load test, the engine shall run with 10 percent overload for a period of 30 minutes. The engine shall run steadily with clear exhaust gas and without excessive vibrations.

**A-1.2.4 Governor Test** — The engine shall be operated suddenly from full load to no-load running and the momentary increase in revolutions per minute shall not exceed 20 percent of the rated revolutions at its full load output.

**A-1.2.5 Endurance Test** — This test shall be carried out for a period of 5 hours under full load and at the rated speed.

**A-1.2.6 Non-supercharging Test** — Engines equipped with exhaust turbo-supercharger shall be tested with supercharger detached for 20 minutes recording the output.

**A-1.2.7 Dismantling and Inspection** — After the completion of the above tests the recorded data shall be examined and any part of engine may be dismantled for examination as may be required by the classification societies/statutory authorities. The defective parts shall be changed and retest carried out as may be necessary.

**A-1.3 Peak Compression Pressure and Temperature** — The temperatures of exhaust gas, fresh circulating water, sea circulating water, lubricating oil, etc, fuel consumption, lubricating oil consumption and the cooling water rate shall be recorded. The maintenance and service manuals shall indicate the maximum allowable temperature and pressure as well as the normal working values.

## **A-2. MAIN AND AUXILIARY GENERATOR ENGINE**

**A-2.1** The tests on main and auxiliary generator engines shall be carried out with full load for 4 hours.

## **A-3. GENERATORS AND MOTORS**

**A-3.1** These tests shall be carried out to the statutory/classification society standards and shall include:

- a) heat run test,
- b) winding and insulation resistance test,
- c) momentary overload test, and
- d) high voltage tests for insulation.

## **A-4. COMPRESSORS, PUMPS AND FANS**

**A-4.1** The full load test in accordance with statutory/classification society standards shall be carried out to test efficiency, smooth operation and vibration.

**A-5. HYDRAULIC EQUIPMENT OTHER THAN PUMPS AND MOTORS**

**A-5.1** These shall be tested for leaks at twice the working pressure.

**A-6. HOPPER GEAR**

**A-6.1** Hopper operating gear shall be tested to a proof load of not less than 1.25 times the safe working load.

**A-7. WINCHES AND LIFTING GEAR**

**A-7.1** Winches and all the lifting gear shall be tested at load to check if the rated hauling speed is obtained at full load. An overload test shall be carried out on each of these at 125 percent rated load. In case it is not possible it may be carried out on-board.

# INDIAN STANDARDS

## ON

### INLAND AND HARBOUR CRAFT

- IS:
- 4647-1968 Detachable steel ladder for inland vessels
  - 4659-1968 Wire real for inland vessels
  - 4690-1968 Mooring buoy shackles
  - 5269-1969 Access hatches for inland vessels
  - 7046-1973 Guide for selection of harbour tugs
  - 7048-1973 Small steel square weathertight hatch covers
  - 7363-1974 Acceptance tests for harbour tugs
  - 8373 ( Part I )-1977 Steel launches: Part I Launches for passenger ferry service

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